



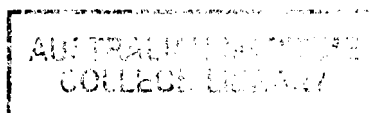
An LIS for your SME

An exploratory study of the implementation of logistics
information systems in small to medium enterprises in
Tasmania

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Abstract

The purpose of this paper is to complete a research project on the implementation of logistics information systems in small to medium enterprises in Tasmania. The project consists of various sections such as a literature review, which reviews secondary data and produces gaps that will be filled with primary data sourced through telephone interviews. The use of telephone interviews to source data was necessary due to the lack of information available on the subject. The questions asked in the interview were designed in two sections, the first having an external environment perspective and the second being focused on the internal environment of the organisation. A discussion of the issues and areas of importance was conducted utilizing the primary and secondary sources, this method meant that a good understanding of the environment and the organisational perspectives on the implementation of logistics information systems was gained.

The results of this study show that participants are aware of the importance of information technology and information systems, but the level of implementation is quite low with many of the systems being quite simple. The benefits of logistics information systems were extensively discussed and it was found that any costs associated with implementation are outweighed by increases in returns, increased efficiency and improved customer satisfaction. After all improvements to the system are determined by the level of satisfaction customers demand, and in order to remain competitive all organisations, regardless of size must be willing to satisfy their needs in order to survive. It is the larger organisations that have realised this and have actively implemented logistics information systems to increase transparency and data exchange.

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1. Introduction

Logistics information systems are increasingly seen as vital to the success of businesses in the transport and logistics sector. Unfortunately, the implementation of such systems is not always easy given the associated costs and time necessary in establishing appropriate information systems (Holyer 2004a p.38-41). For larger organisations, these costs are seen as a factor to its success and as such, management is willing to invest in the appropriate systems. For small to medium enterprises however, the installation of logistics information systems is not as prevalent. Determining the extent of application and comparing small business and larger organisational approaches will be important in gaining an insight as to why small to medium enterprises are less willing to adopt a logistics information systems approach to management and operations.

From the literature available on the topic it is evident that there are a significant number of larger entities applying varying forms of logistics information systems, some industry examples include Toll Holdings, Patrick Corporation, Linfox and Northline (Holyer 2004a p.38-41). While the Government has in place its own initiatives for encouraging smaller organisations to apply this technology to improve their service provision and remain competitive (Australian Logistics Council 2003). Having mentioned this it is concerning that few small to medium enterprises have gone ahead and applied logistics information systems to their businesses. With the literature supporting logistics information systems and evidence of its success found in some of Australia's largest transport service providers, determining why small to medium enterprises are not applying this technology is necessary.

Information systems are easily defined as the flow of information from one source to another; however, there are two distinct types of information flow, internal and external. Internally information systems flow between the different functions and hierarchies of the organisation (Magee et al 1985 p.171). While externally information flows between entities outside of the organisation, mainly customers (Magee et. al. 1985 p.171). During the various stages of the logistics and distribution process both types of information flow

will occur, whether that be in order management, warehouse management or transport management systems. Information systems are increasingly considered as technologically based, however it is worth mentioning that exchange of information can and does occur over many mediums including, internet, meetings and telecommunications. The extent of application of information systems in businesses is important because it indicates a willingness to provide easier means of communication, increased customer service and improves efficiency (Victorian Transport, Distribution and Logistics Industry 2002).

Logistics information systems facilitate the management and administration of the resources, planning and promote development (Rakai and Williamson 1995). They do so by reducing the reliance on the expensive labour resources and capitalise on the use of advanced computer technology and communication technology (Rakai and Williamson 1995). According to Ballou (2004 p.146-152) there are subsystems that the logistics information system can be broken down into, they are (1) order management system (2) warehouse management system (3) and a transportation management system. The information in the individual systems flows through between each subsystem and through to the logistics information systems in the remaining sections of the firm (Ballou 2004). The creation of an integrated system leads to more efficient handling of goods and easy data transfer.

The areas of particular interest in the research project are concerned with the application of information systems mainly in the form of software to the organisations logistics activities, particularly order management system, but that is not to say that other areas will not be considered. The order management system handles much of the interaction with the customer during the initial stages of the transaction. At this stage the order management system is communicating with the warehouse management system to determine product availability, location in the supply chain network and the possible delivery time (Ballou 2004 pp. 146-153). The process then continues to the transport management system where the best transportation methods, planning and freight tracking occur. If all this is correct and the customer's credentials have been checked the transaction will be finalized. Of particular interest is the communication methods that

small to medium enterprises are applying to the information system. Virtual logistics methods may have their place in larger organisations; however, these methods cannot be mirrored in small to medium enterprises.

The Tasmanian environment provides the ideal setting for this research paper due to the size of the transport and distribution industry. Many of the organisations providing transport services can either be classified as small to large organisations. The large organisations are mainly subsidiaries and are strongly supported by mainland links, while the local operators are reliant on statewide services or are owner operators. The organisation and co-ordination of services therefore varies between the two, however they compete for the same market. With customers being the key to any businesses success, all types of businesses must be willing to ensure that they provide services that satisfy customer demands. Knowing what the customer demands and how to satisfy these demands can be difficult, it is therefore important to communicate and establish sound information systems for the transfer of data, trends, statistics and plans that can be utilized along with appropriate management to improve the organisations competitive position.

It will be important to look at certain specific areas when conducting this study to fill in gaps that exist from previous studies. Some such factors that will likely be discussed include, time, money, understanding, infrastructure and vision. These factors affect the organisations ability to install appropriate information technology and operate logistics information systems. In order to fill in the gaps present from the research primary data will be collected through telephone interviews, which will sample transport and logistics service providers in Tasmania. This primary data will be assisted by the secondary data already collected in order to find the reasons for the lack of application of logistics information systems in small to medium enterprises.

2. Literature Review

The purpose of a literature review is to analyse and review the available literature used in the research project. Much of the literature available on logistics information systems in small to medium enterprises is from the internet, which presents an issue regarding validity. However, many of the readings sourced on the internet are from industry websites or are papers written by scholars; therefore, the validity of these resources is significantly higher than originally considered. Much of the information sourced refers to the implementation of logistics information systems in general without much consideration of the specific needs of small and medium enterprises. The few sources that do refer to the implementation of logistics information systems in small to medium enterprises look at the various options regarding the information systems and the extent of implementation or adaptation. That is, whether or not the organisation is introducing and taking on new methods of conducting business or simply operating under new systems which are modeled on other organisational examples.

Some of the sources cited mentioned the unique characteristics of the Tasmanian market, with its many small manufacturers and producers, in coping with the implementation of logistics information systems to improve the transaction process. Given that Tasmania is detached from the mainland and the main shipping lines, it is quite reliant on the services of carriers and distributors on the mainland; additionally the customer base of many of the small producers is located on the mainland or internationally. The Australian government in its campaign to implement e-logistics into the common documented logistics system put forward a number of suggestions as to how the small to medium enterprises of Australia could implement e-logistics. The government moved forward and implemented EAN.UCC standardized data transfer system, functional through barcodes, which stores information such as product, destination, purchaser, delivery date and price. Such a system is designed to improve the delivery time, reduce handling and shipping errors and provide better inventory management and reduce ordering and replenishment times (Anderson 2003). The governments' interest in improving the logistics functions is well meant given the estimated contribution to the nation's gross domestic product of 9%,

or \$57 billion in the year 1999-2000 (Australian Logistics Council 2003). Since then the logistics and freight handling sector has seen mass increases, therefore, developing systems to assist in the management of the industry are of critical importance. E-logistics is a component of the broad logistics information system, which also includes all functions of communication and information exchange, such as paper, file, meeting and conferencing (Magee et al 1985).

The states too have shown a keen interest in improving the logistics information systems in order to improve service provision and reduce the hassles associated with the old documented method of operation. The Victorian Transport, Distribution and Logistics Action Plan (2003) presents a well described outline of the goals it has for the industry, with specific mention of the importance of incorporating the small to medium enterprises in e-commerce and information communication technology. In Tasmania, the development of the Tasmanian Electronic Commerce Center (TECC) is helping to increase and maintain Tasmanian business strengths. They aim to do this by raising awareness of the program, providing planning support and development assistance, infrastructure development and demonstrations (TECC n.d). The small to medium businesses operating in Tasmania, which are currently operating under the documented and telecommunicated system, will benefit greatly from the implementation of the systems being encouraged by these governments. With the implementation of e-logistics systems handling the documentation and operational processes the time previously spent on paper work and telephone and fax correspondence can be utilized performing tasks that can improve those areas the organisation needs improving or its core strengths such as customisation of service provision (TECC n.d).

In the research undertaken, there were also a number of articles and internet sites referring to the extent of information technology adoption. Some of the largest organisations have adopted the Electronic Data Interchange (EDI) system where by they remove the human intervention required in rekeying information and processing documents (Electronic Data Interchange n.d). EDI is computer-to-computer exchange of business documents or information, such as invoices or purchase orders through a

standard interface (Electronic Data Interchange n.d). Unfortunately, the cost and investment of such systems is too much for small organisations operating in business transactions with large retailer. A solution suggested by Cheok Mak and Johnston (1999) and implemented by Coles Myer Limited (CML) is to introduce an ‘intelligent gateway’ form of EDI that is flexible and able to interpret and transfer information in a number of methods to supplier. Therefore, the small and medium enterprises that cannot afford to operate EDI systems can process information via the internet and barcode scanners if possible (Cheok Mak and Johnson 1999). The adoption of such a method simplifies the process for the smaller operator but ensures that the larger organisation is operating at a higher level of efficiency also. However, this model falls short in its ability to be easily applied to small to medium enterprises because it relies on the fact that the other party has Electronic Data Interchange. This is not necessarily the case in all transactions and therefore, although this model is well designed it requires modification in order for it to be adaptable to small to medium enterprises negotiating between each other or with larger enterprises that do not operate under the EDI model or other less sophisticated systems.

Another good example of information systems being adapted to the industry can be found within the Patrick Corporation. The Tasmanian division had lost two valuable customers due to its inability to handle electronic consignments. The solution to this problem was to find an automated system, which could improve service provision. With the combination of Tasmanian Business Online (TBO) (2003), the provider of e-commerce tools which assist small to medium Tasmanian companies adopting e-logistics solutions, and is a product of TECC, and Patrick Groups technology the company was able to improve their old system which required manual organisation and management of pallets. The results are satisfied customers, which they attribute to the fact that customers can track their goods, and better use of resources (ECEnable Limited 2003). It is interesting to note here that customer demand for better service was behind the company’s installation of a logistics information system.

Clearly, the application of logistics information systems is important given that of the suppliers and retailers or customers the most successful are those with coordinated and open relationships where data is transferred easily and action can be taken. In today's business environment the speed of transactions is very important and requires adaptation by all parties. Although logistics information systems may have previously been seen as strictly for larger organisations, it is now considered a necessary competitive tool.

'If you don't have the technological ability that allows you to work very closely with your customer and pull the waste out of their supply chain you will not be in the game. It's as clear and simple as that. Technology will be the difference between being able to improve margins and not being able to make a margin.' Paul Little CEO of Toll (Holyer 2004a p. 38-41). The application of information systems by organisations such as Patrick Tasmania and Coles Myer Limited as well as the investment and endorsement by the federal and state governments indicates that in the future information exchange as well as business transactions will be carried out electronically. Additionally, a similar system to that of Coles Myer Limited, which has also been implemented by Northline, a logistics company operating out of Adelaide, which caters mainly to medium sized enterprises (Holyer 2004b p. 36-38), is proof that this system can work.

For small to medium enterprises the aim is to provide information to users, assist in their planning process, and support their development (TECC n.d.). Customisation of logistics information systems enables small to medium enterprises to operate at a functional level, which is suitable to them. Whether they adapt to complete information systems or simply utilize the internet, as an interface between their customers and the carriers is completely their decision. However, it is crucial that the smaller entities progress with the larger organisations, as increasingly customers are seeking greater transparency in the service provision and are demanding value-adding service.

This study aims at looking closely at the varying degrees of application of information systems and presents an argument of the potential gains available to companies adapting logistics information systems. As can be seen from the above literature, logistics information systems can be classified as any information system from the traditional

documented system to the more advanced application of EDI, which involves the use of internet. As long as there is evident data and information exchange, logistics information systems are in place. Unfortunately, small to medium enterprises are not implementing these more efficient information technology based systems and are missing the advantages associated with operating under logistics information systems. Therefore determining the level of implementation, what factors are effecting implementation and the expected results associated with logistics information systems is important. Additionally it will be important to observe the differences that exist between small to medium operators and larger organisations, to ascertain why larger organisations are increasingly following the trend and smaller entities are not. This will be achieved through the application of extensive primary and secondary research, which is necessary given that there is a shortage of detailed information on the subject.

3. Methodology

In order to gain a greater understanding of the industry and how extensive the application of logistics information systems is in small to medium enterprises it is necessary to carry out research. The main types of research carried out involved primarily secondary sources such as texts, case studies and journals, however given the shortcomings of secondary data, such as its relevance, accuracy, variability given that the authors' perspective may not be the same as the researchers, it was important to undertake primary data sourcing (Zikmund 2003 p. 136-138). Primary data is gathered and assembled primarily for a specific purpose, which in this case is a research project about logistics information systems. The need to source primary data stemmed from the lack of information available on this topic and the need to validate some of the secondary data collected. Secondary sources do not provide accurate information specific to the research projects needs, therefore sourcing data to fill in the gaps will complete the information gaps and allow accurate conclusions to be drawn (Zikmund 2003 p. 63-64).

In the research design primary data collection for this project was through telephone interviews, however, alternatives to telephone interviews when conducting exploratory research included face to face interviews, these were too time consuming, mail out surveys, these seemed too unreliable or pilot studies, which are too specific given that the problem is being explored. Therefore, the most appropriate choice was to conduct telephone interviews, the information in these will support the secondary data available on the subject and will allow new conclusions to be drawn. Some of the advantages and disadvantages of carrying out telephone interviews include speed, particularly when compared to the length of time needed for mail out surveys; the speed at which a large group can be interviewed is of great advantage (Zikmund 2003 p.208-211). Costs are minimal, particularly when utilizing landline links. The absence of face-to-face contact can be considered both an advantage and disadvantage given that some respondents may feel more comfortable answering personal questions without face-to-face contact. While the absence of face-to-face contact could be a disadvantage given that there is a

significant portion of communication that is non-verbal and respondents may not answer completely or be cut off by the interviewer during a pause (Zikmund 2003 p.208-211).

The duration of a telephone interview is a disadvantage in most cases, participants are unwilling to co-operate in a telephone interview if it is longer than 30 minutes. Most candidates are however willing to participate if the duration of the call is 5 to 10 minutes in length. Therefore, the length of the telephone interview can limit the number of willing candidates and sample population (Zikmund 2003 p.208-211). Finally, the co-operation of the sample population can have two sides to it also. An advantage to telephone interviews over door-to-door interviews is the increased safety to the interviewer and respondent, willingness to participate given that the respondent does not feel their personal space has been invaded. Unfortunately, the disadvantages of telephone interviews are that co-operation is difficult to achieve if the participants are not answering the phone or returning messages (Zikmund 2003 p.208-211).

The selection of possible telephone interview candidates was difficult due to the fact that the sample had to be compiled without bias in a random selection. Originally, the selection of possible candidates was to be collected from the local area through referencing to business guides however, the selection was too narrow and there was a certain amount of bias in the selection of businesses from the guide. Therefore it was determined that a search for small businesses would be conducted on the internet to find willing participant in Tasmania. The search came up with a Biz Tas directory, which had a number of Tasmanian operated industries categorized one of which was transport and distribution. This list was used to find willing participant in the telephone interviews that would assist in sourcing primary data. Some businesses in the list were eliminated due to the fact that their area of operations was not equal to other participants, such as furniture removers who handle goods solely for one customer at a time and do not encounter the same problems transport and distribution companies encounter. Commonly the participants in the survey were transport and distribution service providers in the road haulage sector or operators in intermodal operations.

The process of conducting the interviews requires planning and preparation in order to ensure that all aspects were well organised for the respondents answers. The questions asked in the interview have been planned ahead of time and proofed by the supervising lecturer to ensure that they cover the relevant data and that respondents will be able to understand what is being asked of them. Attached is a copy of the telephone interview questions in Appendix 1. Preparation of the questions for the conduction of telephone interviews seemed the best option given that telephone interviews are quicker to conduct then mail out surveys, telephone surveys also improve response rates, given that some participants may open a survey and be too busy to complete it, while a telephone interview requires 10 minutes of the participants time.

The questions asked in the interview can be grouped into three groups, the first of which is based on gaining background information from the industry, that is to get an insight into the importance of logistics information systems to the industry from the participant, an environmental analysis if you like. Secondly, the next lot of questions is attempting to gain an insight into the application of logistics information systems in the individual interviewed organisations, an internal analysis. Lastly, personal information about the participant is gained. The method for analyzing the data will be through content analysis of the two prominent sections. Content analysis measures how often an instance occurs, in this case various phrases repeat themselves, therefore using these key words to represent the occurrences will ensure that a trend and analysis of the data from the respondents will be easily analysed. The final categories of data will not be analysed in the same manner given that the questions provide little valid information, information that does not necessarily need to be analysed in a table of results. It will however be mentioned later on if it is necessary to the discussion and conclusions.

The type of research being carried out is exploratory research, which is particularly useful in situations where knowledge is limited; this initial research will clarify and define the nature of the problem (Zikmund 2003 p. 109-133). Being a preliminary study exploratory research will open up the doors for more detailed studies down the track utilizing this research. According to Zikmund (2003 p. 109-133) the majority of exploratory research

provides qualitative data, that is it provides a greater understanding of the issue by focusing on words and observations, stories, visual portrayals, meaningful characterizations, interpretations, and other expressive descriptions. For the purpose of this assignment the extent of the adoption of logistics information systems by small to medium enterprises will be looked at, by utilizing exploratory research it is possible to diagnose the various dimensions of the problem.

The research topic selected for this project is not well documented in journals, texts and internet sites. The lack of secondary data available on this issue means that data needs to be purposefully collected in order to complete the project. Of the information gathered there is a significant amount of relevant data on e-logistics, information systems and its application in large businesses capable of applying innovative solutions to their logistics problems. Therefore due to the lack of information present on the application of logistics information systems in small to medium enterprises it is necessary to carry out this research topic and under take an investigative study as to the reasons for its poor application. Determining the factors affecting its application, and the differences between small and large entities, which reflect the differences in application of information systems given the factor of size, resources and knowledge. This process will hopefully provide conclusive answers and reasoning as to why these events are occurring and what action small to medium enterprises need to take in order to remain competitive in an industry that is increasingly turning to information technology to improve its practices.

4. Results

4.1 Environmental Analysis

Question 1: Do you see Information Technology as having an increasing impact on Logistics Services?

Question one of the first section, designed to gather information on the organisations opinion of the importance of logistics information systems in small to medium enterprises in the logistics and distribution industry, asks the participant their opinion on the increasing impact of information technology on logistics services. Given that most organisations have seen the increased use of such systems in handling invoices, allocating stock, managing inventory and distribution, generally improving the service provision of both large and small organisations, it is important to measure whether participants viewed information technology as having an increasingly larger impact on logistics services. All participants agreed that information technology is having an increasing impact on logistics services.

Table 1

Interview Participants	Participants opinion on the increasing impact of information technology on logistics services
Participant 1	Yes
Participant 2	Yes
Participant 3	Yes
Participant 4	Yes
Participant 5	Yes

Question 2: Do you believe that Logistics Information Systems are necessary, given that logistics information systems functionally involve the transfer of information for logistics purposes while operationally it is the input, the management of the data and the output of information?

Question two asked whether logistics information systems are necessary, it provided a definition of logistics information systems in order to ensure that the participant was clear on the function of logistics information systems. For many organisations previously managing logistics was a function the general manager conducted, by not having a specific logistics manager on hand the appropriate expertise could not be applied to ensure that the system ran as efficiently as possible and to the benefit of the whole organisation. Now information systems are in place to assist in the management of logistics and to provide solutions to various logistics problems, regardless of size. Participants all agreed that given the definition logistics information systems are necessary.

Table 2

Interview Participants	Participants opinion on the necessity of Logistics Information Systems
Participants 1	Yes
Participants 2	Yes
Participants 3	Yes
Participants 4	Yes
Participants 5	Yes

Question 3: If logistics information systems can range from the Internet to Electronic Data Interchange (EDI), to what extent have you installed this system in your business?

Question three seeks to scale the extent to which organisations have implemented logistics information systems in their own businesses. By having respondents name and recognize the systems in place in their own organisation a better understanding of the scale of the implementation of logistics information systems in small to medium enterprises was achieved. Participants had a range of answers to this question, as illustrated in Table 3, this information becomes useful again further on in the interview.

Table 3

Interview Participants	To what extent have Logistics Information Systems been implemented in the participants organisation
Participant 1	Full extent, internet, tracing etc.
Participant 2	Very Little
Participant 3	Not much
Participant 4	Both
Participant 5	Only a little, the simplest form

Question 4: Do you think that big organisations are placing pressure on small operators to implement Logistics Information Systems?

Questions four asks respondents to comment on the industry pressures present upon them and other small to medium operators from larger organisations who have the advantage of economies of scale and available resources. From this question a better understanding of the environment and the environmental pressures upon smaller organisations to follow the lead of larger organisations will be gained. The results from the interview indicated a mixed response with some participants feeling that there was pressure placed on them from larger organisations to install such systems otherwise they would not be competitive enough. Others believed that the pressure was from customers who dictate the market trend towards greater integration with information systems. Others did not believe that big organisations had much of an effect on small to medium enterprises at all.

Table 4

Interview Participant	Participants response to the existing pressures on smaller organisations from larger organisations
Participant 1	No, Not in Tasmania
Participant 2	No
Participant 3	Yes
Participant 4	Yes, however this is dictated by customers whose needs must be met
Participant 5	Yes

Question 5: Do you believe that in some cases this pressure is leading some small to medium enterprises to close down?

Question five takes the previous question further by trying to connect the pressure from large organisations to the closure of some smaller operators. Given that larger organisations are capable of keeping up to date with technology and various methods it is at the smaller operator’s disadvantage. That is are smaller operators closing because they cannot compete with larger organisations who specifically have logistics information systems in place. The results show that the majority of participants believe that pressure from larger organisations to implement logistics information systems is not leading to closures of some smaller operators in the transport and distribution industry.

Table 5

Interview Participant	Participants thoughts on whether they believe the pressure is leading to the closure of smaller organisations
Participant 1	No
Participant 2	Yes
Participant 3	Yes
Participant 4	No, they struggle to meet customer needs, although possible if they lack the IT backbone
Participant 5	No

Question 6: Do you believe that Logistics Information Systems are only necessary in service providers, such as couriers, transport operators etc. rather than retailers and manufacturers?

Question six asks the respondent to determine from their perspective whether they believe logistics information systems are only necessary for service providers. This questions is designed to increase our knowledge of the respondent and their opinion regarding the application on information systems to their businesses. The respondent may be of the view that only those parties who have large inventories and handle goods a number of times across many transactions are only in need of such systems. The respondents tend to lean to the view that both parties whether simply providing a service or if operating as members of a large functional group such as manufacturers are to benefit from the installation of logistics information systems.

Table 6

Interview Participants	Participants belief on the best application of Logistics Information Systems
Participant 1	Yes
Participant 2	Yes
Participant 3	No, both parties will require it
Participant 4	Both will need it
Participant 5	Both parties benefit from such systems

4.2 Internal Analysis

Question 7: a) What logistics Information Systems have been implemented in your organisation? b) To what extent have logistics information systems been implemented?

Question seven really is the combination of two question that were asked to the participants. For the purpose of improving the understanding of the results we will illustrate them together. The first concerns the identification of logistics information systems in the organisation while the other is the extent to which they have been implemented, that is do they improve the organisations processes or do they also help customers. The results varied across the different organisations.

Table 7

Interview Participants	Identification of LIS in the organisations
Participant 1	Freight Management through hub
Participant 2	Communication via telephone
Participant 3	Electronic Billing, Internet
Participant 4	Industry Package, joint venture with an external service provider: Roadrunner
Participant 5	Faxes, Internet communication

Table 8

Interview Participants	Extent of implementation
Participant 1	Throughout organisation to the customers
Participant 2	Totally
Participant 3	Between customer and company
Participant 4	Across the board
Participant 5	Between the company and sub-contractor

Question 8: In which subsystems of LIS would you categorise the greatest improvement or the area of importance where LIS has particularly been installed?

- Order management system
- Warehouse management system
- Transport management system

Question eight looks more closely at logistics information systems and how the system can be divided into segments reflecting the various areas of importance in logistics management. The aim of this question is to determine the particular areas of importance to the participants of the interview process. From the results table it is clear that transport management is the area of the greatest importance and where improvements have been focused on. This is of no big surprise though given that the participants are all involved in the same industry.

Table 9

Interview Participants	Determining which segment of LIS is most important to the participants
Participant 1	Transport Management foremost then order management and warehouse management to a certain extent
Participant 2	Unable to answer
Participant 3	Transport Management
Participant 4	Transport Management primarily
Participant 5	Transport Management

Question 9: a) Does the use of Logistics Information Systems improve your operations? b) How?

Again we combine two separate questions for the purpose of simplifying the compilation process and making it easier to understand the results. This question is directed clearly at the organisation in order to determine how the logistics information systems assist the organisation. The results indicate that various repeating benefits are common amongst those participants who have implemented logistics information systems.

Table 10

Interview Participants	Has LIS improved the organisation
Participant 1	Yes
Participant 2	Yes
Participant 3	Yes
Participant 4	Yes
Participant 5	Yes

Table 11

Interview Participants	How has LIS improved the organisation
Participant 1	Time efficiency, simplified job processing, data exchange and increased organisation
Participant 2	No Answer
Participant 3	Customer satisfaction and easier management
Participant 4	Efficiency, asset allocation, customer satisfaction
Participant 5	Simplified job processing

Question 10: In the competitive environment do you believe that LIS have improved your businesses competitive position?

Question ten recognizes the importance of determining whether logistics information systems are effecting the service provision of the organisations interviewed. It is important to be able to recognize whether or not there is an obvious improvement in the organisation that can be attributed to the implementation of the logistics information system. In addition, it is important to recognize if the improvement has led to a improved position in the competitive environment. From the results we can see that participants had at least a little impact from the implementation, some more than others, but this can be explained by the extent of implementation in the individual organisations.

Table 12

Interview Participants	Has LIS improved your businesses competitive position in the competitive environment
Participant 1	Making a difference
Participant 2	Not really
Participant 3	Yes
Participant 4	Has been a tool, assisted in recognizing important aspects that are vital to success
Participant 5	A little

Question 11: a) What costs have you had to incur due to the implementation of LIS?

- People
- Financial
- Time
- Other

b) Of the costs incurred to your business, which would you say had the greatest benefit to your organisation in improving service provision or operational activities?

Question eleven is a combined question again that will explain the costs that organisations have to incur in order to implement and operate logistics information systems effectively. Additionally, determining which cost provided the biggest benefit to the organisation will assist in finding the area that benefited the most from the implementation of the logistics information system. From the results there were varied responses, some participants chose not to answer, while those that did respond indicated a number of the options listed, particularly time.

Table 13

Interview Participants	Costs incurred due to the implementation of LIS
Participant 1	All of them, additionally resources spent for research
Participant 2	Time
Participant 3	Time
Participant 4	No Comment
Participant 5	Financial and Time

Table14

Interview Participants	Which cost provided the greatest benefit to the organisation
Participant 1	Not in a position to say
Participant 2	No answer
Participant 3	No response
Participant 4	No Comment
Participant 5	Time, learning and improving the effectiveness of the systems

Question 12: Do you believe these costs have been worthwhile?

Question twelve provides a very important question regarding the general opinion of the parties who implemented the system. Do they believe that the costs are out weighted by the advantages implementing such a system brings the organisation. The general trend is that the costs organisations incur are all worthwhile given the benefits available to the organisation by implementing such systems.

Table 15

Interview Participants	Have the costs of installing LIS been worthwhile
Participant 1	Yes
Participant 2	Yes
Participant 3	In the long term
Participant 4	Yes
Participant 5	Yes

Question 13: a) Have outsourced logistics information systems been installed into your organisation? b) or have you installed customized LIS?

Question thirteen is a combined question that tackles the issue of whether or not the logistics information system in the organisation is outsourced, that is developed by a third party and fitted in to the organisation. On the other hand, if the system is customized to the individual needs of the organisation, therefore it fits the specific needs of the company. Clearly no participant has chosen to apply an existing model to their organisation, instead they have applied a customized logistics information system that would be better suited to the individual needs of the smaller service providers.

Table 16

Interview Participants	Have outsourced LIS been installed
Participant 1	No
Participant 2	No
Participant 3	No
Participant 4	No
Participant 5	No

Table 17

Interview Participants	Have you installed customized LIS
Participant 1	Customized
Participant 2	No
Participant 3	Yes
Participant 4	Yes, customized
Participant 5	Yes

Question 14: What are the main drawbacks of logistics information systems in your organisation?

Question fourteen looks at the possible negative aspects of applying logistics information systems to an organisation. Not only are there initial costs but there are also on going costs that must be factored in. Some organisations may find the systems too complex, or sophisticated for their organisation. The findings show that there are few drawbacks experienced from implementing logistics information systems to an organisation. Participant no. 1 mentions the loss of customer contact, this is an increasing trend as processes become increasingly automated and information technology intervenes and completes the duties previously fulfilled by people.

Table 18

Interview Participants	The drawbacks of LIS
Participant 1	Full automation, loss of customer contact
Participant 2	None, the phone bill
Participant 3	None that he could think of
Participant 4	None- never drawbacks only implementation issues
Participant 5	None that could be thought of

5. Discussion

5.1 Background

The transport and logistics industry, as with most industries, has been affected by the increased development and incorporation of information technology into its operational systems. Information technology has influenced all areas of logistics including warehousing, manufacturing, transportation, inventory control and order entry (Magee et al 1985 pp171-190). Information systems utilize information technology to process information, control systems and develop solutions to logistical problems. Logistics information systems can be defined as structures involving people, equipment and procedures which make relevant information available across the organisation for the purpose of planning, implementing and control in that organisation (Coyle et al 1988 pp 488-522). Therefore, the management of information with information systems and technology along with logistics managers ensures the proper handling of information and the development of that information to assist in the proper management of the organisation.

Although various organisations in the business environment have been applying and developing these systems to suit their unique needs the transport sector has been slow to implement these systems, particularly smaller operators. There is a lot of evidence to support the implementation of logistics information systems into transport and logistics organisations, however so far only larger service providers have been willing to implement these systems to their organisations. Additionally, support from government bodies and business societies is encouraging the application of these systems in order to improve service standards, encourage business development and help smaller operators to remain competitive in a market that is increasingly being consolidated.

The purpose of the discussion is to utilize the information we have from our secondary and primary sources to discuss the implementation of logistics information systems in

small to medium enterprises in Tasmania. The various areas that will be covered in this discussion will include technology, competitive advantage, costs and service quality.

5.2 Technology

Information systems are commonly considered computerized and automated systems, which are used for information processing, but this is not always the case. Information systems transfer knowledge and information between parties, this process is now commonly facilitated by technology but can also include other forms of information flow such as meetings, documents and telecommunication (Magee et al 1985 pp 171-190). According to Ross (1985 p15) the implementation of computerized technologies is a necessary part of those organisations seeking to improve productivity, competitive advantage and customer service. Information systems link parties to improve communication, in doing so service providers are more informed of customers requirements and are able to fulfill their needs more appropriately. All participants felt that information technology is having an increasing impact on logistics services and that logistics information systems are necessary. Interestingly, the range of technologies applied to the various organisations ranged from the simplest, telephone communication, faxes, documentation, to sophisticated customized systems that have been formulated specifically to the organisations needs.

It is also important to note that as the larger organisations increasingly turn to more sophisticated technology to reduce costs, increase productivity and remain market leaders, they expect smaller operators to develop their own systems to ensure that data processing is as efficient as possible (Holyer 2004a pp 38-41). Not all large service providers are as willing to accommodate small businesses, they expect some form of co-operation and development, even if it is only enough to improve productivity and improve data exchange (Cheok Mak & Johnson 1999). Unless smaller operators become aware of this they may find that they cannot survive. From the interviews some participants felt that there was pressure from larger organisations to implement logistics

information systems, of these some felt that this pressure was leading to smaller operators closing. Clearly this is concerning and smaller companies should be trying to implement interfaces between themselves and larger service providers and their customers, thereby increasing the amount of communication between the parties and simplifying the transfer of data, but also providing the customer greater transparency which is increasingly important in the transport and distribution sector.

5.3 Competitive Advantage

Organisations can gain a competitive advantage over other organisations by doing a number of things, whether that be providing a unique service, differentiation or having a first mover advantage. The marketing concept is a model that has easily been applied to the logistics sector. The concept is designed to achieve organisational goals by determining the needs and wants of target markets and delivering customer satisfaction more efficiently and effectively than competitors, simply, that the business should exist for the sole purpose of meeting customers needs (Stock & Lambert 2001 pp 6-9). The marketing concept has three critical areas, firstly, the marketing mix, where the four p's of having the right product, at the right price, with the assistance of the right promotion, and at the right place, should be integrated. The other two areas include customer satisfaction, these include the suppliers, intermediate customers and final consumers, and company profit, which is very important as it maximizes profit and has many long-term benefits (Stock & Lambert 2001 pp 6-9).

Logistics information systems can provide assistance to the various functions and processes involved in conducting the various exercises necessary in achieving a competitive advantage through the marketing concept, after all they are there to assist in the facilitation of the transfer of information across the organisation and through to business relationships. For smaller organisations, it may seem as though such models are to elaborate for their organisations, however, by ensuring that the company can satisfy customer needs, market the organisation appropriately, and ensure that the company

profit is well managed, any organisation can benefit from the application of such a concept regardless of their size and capabilities. From the respondents answers the implementation of logistics information systems has been successful for the most part. Only one respondent stated that they did not really think that the implementation assisted their competitive position, the remaining respondents however were more positive and agreed that logistics information systems did improve their organisations competitive position.

5.4 Costs

Often when new technologies are introduced there are large costs associated with their implementation. Measuring the cost-benefit analysis will provide the organisation with the necessary information to determine the profitability of installing logistics information systems. This process requires comparing the costs associated with installing the new system against the returns from the point in time when the system was introduced. According to Lambert et al (1998 pp 75-110) the cash flow would have improved, unless the system implemented was more then the company needed. Given that many small to medium enterprises are not able to invest in research adopting the correct technology could be difficult for the small operator to determine. However, a small investment in logistics information systems is better then none.

Logistics information systems need not be large elaborate and complex, instead they could be as simple as internet connections and compatible software packages that improve communication between parties and provide an interface that encourages the use of information systems (Tasmanian Business Online 2003). Not all costs are financial either, other resources that can be considered as costs, include people and time. These other factors are quite obvious costs given that an increasing trend is the replacement of people due to automation, and that time is a resource used in research, development, installation and learning. There is primary evidence that the costs associated with

installing logistics information systems have been worthwhile, with the participants unanimously agreeing that the investment was a good one.

6. Limitations

There are a number of limitations in this study, which primarily concern the collection of data. It was determined that the best method for collecting primary data would be through telephone interviews which provided good responses from participants. However, some of the disadvantages of this system are the limited duration of the calls; many participants were willing to participate if the call was quite brief. Therefore, it was difficult to gain a detailed understanding of the systems they had in place and what they thought of logistics information systems. The number of participants was quite small, therefore the information collected may not be sufficient enough to gain a broad understanding of the situation. Additionally, the transcripts containing the interview information were conducted by listening to the conversation and pulling out pertinent points, key words and statements. This method unfortunately meant that some of the information was lost, information that could have been relevant and helpful. A better choice would have been to purchase the appropriate device and record the conversations.

7. Conclusion

The implementation of logistics information systems in small to medium enterprises in Tasmania's transport and logistics industry is considered to be important to the survival of the many small service providers, however, the systems in place are not fully developed to gain the most from their potential. From the interviewed participants there is clearly an understanding that information technology is having an increasingly larger influence on logistics services, likewise the development of logistics information systems to handle the information relevant to logistics is increasingly important. Larger organisations have been keen to develop these systems but smaller enterprises are not as quick on the up take. The benefits of implementation out way the costs, and as it is the costs can be limited to those of internet connection and software installation, which are designed to manage inventory, solve logistical problems and assist in the transfer of data between relevant parties.

By measuring the application of logistics information systems in small to medium enterprises in Tasmania a general idea of the implementation in smaller service providers across Australia can be assumed. Given this it is important that development and implementation shift down to the smaller operators otherwise smaller operators will be forced to close because they are unable to satisfy customer needs like larger providers can. Logistics information systems increase the transfer of data and in doing so the increase the organisations ability to fulfill the customer's needs, therefore satisfied customers means greater returns. Larger organisations have seen this and acted upon the customer's demands, in doing so they have increased customer satisfaction and organisational returns.

Organisations that are willing to develop systems compatible with larger service providers, and which are able to see logistics as an important part of the organisation that must be handled correctly and strategically will benefit greatly from implementing logistics information systems. The increased data transfer will be appropriately utilized to

improve service provision to customers, the costs will be outweighed by the increases in return and the increased efficiency in operations will ensure that the organisation is capable of sustainable development in the long term.

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9. Appendix 1

Survey Questions

Do you see Information Technology as having an increasing impact on Logistics Services?

Do you believe that Logistics Information Systems are necessary, given that logistics information systems functionally involve the transfer of information for logistics purposes while operationally it is the input, the management of data and the output of information?

If Logistics Information Systems can range from the Internet to Electronic Data Interchange (EDI), to what extent have you installed this system in your business?

Do you think that big industries are placing pressure on small operators to implement Logistics Information Systems?

Do you believe that in some cases this pressure is leading some SME to close down?

Do you believe that Logistics Information Systems are only necessary in service providers, such as couriers, transport operators etc. rather than retailers and manufacturers?

What Logistics Information Systems have been implemented in your organisation?

To what extent have LIS been implemented?

In which subsystem of LIS would you categorise the greatest improvement or the area of importance where LIS has particularly been installed?

Order Management System?

Warehouse Management System?

Transport Management System?

Does the use of LIS improve your operations?

How?

In the competitive environment do you believe that LIS have improved your businesses competitive position?

What costs have you had to incur due to the implementation of LIS?

People?

Financial?

Time?

Other?

Of the costs incurred to your business, which would you say had the greatest benefit to your organisation in improving service provision or operational activities?

Do you believe these costs have been worthwhile?

Have outsourced LIS been installed into your organisation?

Have you installed customized LIS?

What are the main drawbacks of LIS in your organisation?

What industry would you classify your business?

What position in the company do you hold?

How long have you been in the company?

Would you like a copy of the paper that your survey is contributing to?

10. Appendix 2

Survey Results

Survey One

1. Do you see Information Technology as having an increasing impact on Logistics Services?

Yes

2. Do you believe that Logistics Information Systems are necessary, given that logistics information systems functionally involve the transfer of information for logistics purposes while operationally it is the input, the management of data and the output of information?

Yes

3. If Logistics Information Systems can range from the Internet to Electronic Data Interchange (EDI), to what extent have you installed this system in your business?

Full extent, Internet, Tracing goods etc., they believe themselves to be the most technologically advanced courier service provider

4. Do you think that big organisations are placing pressure on small operators to implement Logistics Information Systems?

Not in TAS, They knew it was the way to go in order to gain market share.

5. Do you believe that in some cases this pressure is leading some SME to close down?

No

6. Do you believe that Logistics Information Systems are only necessary in service providers, such as couriers, transport operators etc. rather than retailers and manufacturers?

Yes it is a necessity – improves service provision, for both customer and organisation

7a. What Logistics Information Systems have been implemented in your organisation.

Freight Management through hub

7b. To what extent have LIS been implemented?

Through out the organisation and to the customer, providing them with the knowledge and understanding of the system for improvement of use

8. In which subsystem of LIS would you categorise the greatest improvement or the area of importance where LIS has particularly been installed?

Order Management System?

Warehouse Management System?

Transport Management System?

Transport management first and foremost then order management and warehouse management to a certain extent

9a. Does the use of LIS improve your operations?

Yes

9b. How?

Time efficiency, job processing is easier, the internet has improved operations by providing a means of data exchange, no longer is it necessary to calculate and invoice and do all these functions separately. Programmed cost, invoicing and planning allows the customer to do some of the organizing and all it takes is a press of a button to get the invoice out

10. In the competitive environment do you believe that LIS have improved your businesses competitive position?

Making a difference

11a. What costs have you had to incur due to the implementation of LIS?

People?

Financial?

Time?

Other?

All, plus time spent conducting research. See the future of automation, fitting vehicles with equipment allowing them to receive information and be able to plan and work better.

11b. Of the costs incurred to your business, which would you say had the greatest benefit to your organisation in improving service provision or operational activities?

Not in a position to say

12. Do you believe these costs have been worthwhile?

Yes

13a. Have outsourced LIS been installed into your organisation?

No

13b. Have you installed customized LIS?

Customised, continuous improvement to the system allowing it to function better

14. What are the main drawbacks of LIS in your organisation?

Full automation, loss of customer to office contact, which is very important to the service industry.

What industry would you classify your business?

Courier

What position in the company do you hold?

Manager in Tasmania

How long have you been in the company?

3 years

Would you like a copy of the paper that your survey is contributing to?

Yes

Survey Two

1. Do you see Information Technology as having an increasing impact on Logistics Services?

Yes

2. Do you believe that Logistics Information Systems are necessary, given that logistics information systems functionally involve the transfer of information for logistics purposes while operationally it is the input, the management of data and the output of information?

Yes

3. If Logistics Information Systems can range from the Internet to Electronic Data Interchange (EDI), to what extent have you installed this system in your business?

Very little

4. Do you think that big organisations are placing pressure on small operators to implement Logistics Information Systems?

No

5. Do you believe that in some cases this pressure is leading some SME to close down?

Yes

6. Do you believe that Logistics Information Systems are only necessary in service providers, such as couriers, transport operators etc. rather than retailers and manufacturers?

Yes

7a. What Logistics Information Systems have been implemented in your organisation?

Communication via Telephone

7b. To what extent have LIS been implemented?

Totally

8. In which subsystem of LIS would you categorise the greatest improvement or the area of importance where LIS has particularly been installed?

Order Management System?
Warehouse Management System?
Transport Management System?

Unable to answer

9a. Does the use of LIS improve your operations?

Yes

9b. How?

No answer

10. In the competitive environment do you believe that LIS have improved your businesses competitive position?

Not really

11a. What costs have you had to incur due to the implementation of LIS?

People?

Financial?

Time?

Other?

Time

11b. Of the costs incurred to your business, which would you say had the greatest benefit to your organisation in improving service provision or operational activities?

No answer

12. Do you believe these costs have been worthwhile?

Yes

13a. Have outsourced LIS been installed into your organisation?

No

13b. Have you installed customized LIS?

No

14. What are the main drawbacks of LIS in your organisation?

None, the phone bill

What industry would you classify your business?

Transport

What position in the company do you hold?

Sole owner

How long have you been in the company?

8 years

Would you like a copy of the paper that your survey is contributing to?

No

Survey Three

1. Do you see Information Technology as having an increasing impact on Logistics Services?

Yes

2. Do you believe that Logistics Information Systems are necessary, given that logistics information systems functionally involve the transfer of information for logistics purposes while operationally it is the input, the management of data and the output of information?

Yes

3. If Logistics Information Systems can range from the Internet to Electronic Data Interchange (EDI), to what extent have you installed this system in your business?

Not much

4. Do you think that big industries are placing pressure on small operators to implement Logistics Information Systems?

Forced

5. Do you believe that in some cases this pressure is leading some SME to close down?

Yes

6. Do you believe that Logistics Information Systems are only necessary in service providers, such as couriers, transport operators etc. rather than retailers and manufacturers?

No

7a. What Logistics Information Systems have been implemented in your organisation?

Electronic Billing

7b. To what extent have LIS been implemented?

Between customer and company

8. In which subsystem of LIS would you categorise the greatest improvement or the area of importance where LIS has particularly been installed?

Order Management System?

Warehouse Management System?

Transport Management System?

Transport Management

9a. Does the use of LIS improve your operations?

Customer Service

9b. How?

Satisfaction, easier to manage

10. In the competitive environment do you believe that LIS have improved your businesses competitive position?

Yes

11a. What costs have you had to incur due to the implementation of LIS?

People?

Financial?

Time?

Other?

Time

11b. Of the costs incurred to your business, which would you say had the greatest benefit to your organisation in improving service provision or operational activities?

No response

12. Do you believe these costs have been worthwhile?

In the Long term

13a. Have outsourced LIS been installed into your organisation?

No

13b. Have you installed customized LIS?

Yes

14. What are the main drawbacks of LIS in your organisation?

None that he could think of

What industry would you classify your business?

Transport

What position in the company do you hold?

Director

How long have you been in the company?

12 Years

Would you like a copy of the paper that your survey is contributing to?

Yes

Survey Four

1. Do you see Information Technology as having an increasing impact on Logistics Services?

Yes

2. Do you believe that Logistics Information Systems are necessary, given that logistics information systems functionally involve the transfer of information for logistics purposes while operationally it is the input, the management of data and the output of information?

Yes they are, an interface between customer and organisation

3. If Logistics Information Systems can range from the Internet to Electronic Data Interchange (EDI), to what extent have you installed this system in your business?

Both

4. Do you think that big industries are placing pressure on small operators to implement Logistics Information Systems?

Yes, however it is important to note that the customer dictates their needs, that is the customer is driving the organisations to change in order to meet their requirements. So larger organisations are not necessarily pressuring the SME but rather they are placing a precedence and serving customers that drives the organisations need to implement LIS

5. Do you believe that in some cases this pressure is leading some SME to close down?

No, they struggle to meet the needs. Closure may occur when small operators lack the IT backbone to survive, the IT infrastructure that is crucial to an organisations ability to operate.

6. Do you believe that Logistics Information Systems are only necessary in service providers, such as couriers, transport operators etc. rather than retailers and manufacturers?

No, they act as an interface to both in order management, transport and distribution and data processing. Both sectors will require it.

7a. What Logistics Information Systems have been implemented in your organisation?

Industry Package – through a joint project with Road Runner. Involves profitability reporting, organisation, information exchange and the like. Important to note that there is not one single system for the whole organisation. The Logistics Information Systems operating in the various sectors are all different customized to the various needs of the area. For example stevedoring has its own, road has its own etc.

7b. To what extent have LIS been implemented?

Across the board

8. In which subsystem of LIS would you categorise the greatest improvement or the area of importance where LIS has particularly been installed?

Order Management System?

Warehouse Management System?

Transport Management System?

Transport management mainly, paperless warehouse management system in place in Devonport.

9a. Does the use of LIS improve your operations?

Yes

9b. How?

Efficiency, asset allocation, customer satisfaction

10. In the competitive environment do you believe that LIS have improved your businesses competitive position?

It has been a tool, helped recognizing the cost vs revenue which is important to operations and service delivery

11a. What costs have you had to incur due to the implementation of LIS?

People?

Financial?

Time?

Other?

No comment

11b. Of the costs incurred to your business, which would you say had the greatest benefit to your organisation in improving service provision or operational activities?

No comment

12. Do you believe these costs have been worthwhile?

Yes

13a. Have outsourced LIS been installed into your organisation?

No

13b. Have you installed customized LIS?

Yes customised

14. What are the main drawbacks of LIS in your organisation?

None – never drawbacks only implementation issues

What industry would you classify your business?

Transport logistics and distribution

What position in the company do you hold?

Management

How long have you been in the company?

2 years

Would you like a copy of the paper that your survey is contributing to?

Yes

Survey Five

1. Do you see Information Technology as having an increasing impact on Logistics Services?

Yes

2. Do you believe that Logistics Information Systems are necessary, given that logistics information systems functionally involve the transfer of information for logistics purposes while operationally it is the input, the management of data and the output of information?

Yes

3. If Logistics Information Systems can range from the Internet to Electronic Data Interchange (EDI), to what extent have you installed this system in your business?

Neither

4. Do you think that big industries are placing pressure on small operators to implement Logistics Information Systems?

Yes, otherwise they are unable to keep up and compete.

5. Do you believe that in some cases this pressure is leading some SME to close down?

No

6. Do you believe that Logistics Information Systems are only necessary in service providers, such as couriers, transport operators etc. rather than retailers and manufacturers?

Both parties benefit from such systems

7a. What Logistics Information Systems have been implemented in your organisation?

Internet communication, faxes

7b. To what extent have LIS been implemented?

Between the organisation and the subcontracted party (the organisation interviewed)

8. In which subsystem of LIS would you categorise the greatest improvement or the area of importance where LIS has particularly been installed?
Order Management System?

Warehouse Management System?
Transport Management System?

Transport Management

9a. Does the use of LIS improve your operations?

Yes

9b. How?

Simplifies job processing

10. In the competitive environment do you believe that LIS have improved your businesses competitive position?

A little

11a. What costs have you had to incur due to the implementation of LIS?
People?
Financial?
Time?
Other?

Financial costs for the cost of IT infrastructure and Time

11b. Of the costs incurred to your business, which would you say had the greatest benefit to your organisation in improving service provision or operational activities?

Time, learning and improving the effectiveness of the system

12. Do you believe these costs have been worthwhile?

Yes

13a. Have outsourced LIS been installed into your organisation?

No

13b. Have you installed customized LIS?

Yes

14. What are the main drawbacks of LIS in your organisation?

None that could be thought of

What industry would you classify your business?

Transport and Distribution

What position in the company do you hold?

Manger

How long have you been in the company?

20 years

Would you like a copy of the paper that your survey is contributing to?

Yes